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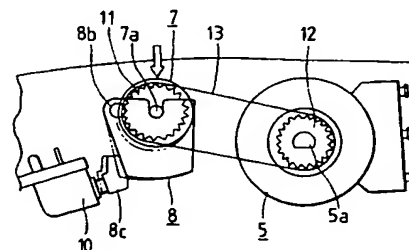
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(54) **Remote control device.**

(57) A hand-held remote control housing (1) comprises a roller (7) to be manipulated by a finger. A movable bearing member (8) has a receiving portion (8a) to support a rotary shaft (7a) of the roller (7) and a pressing portion (8c) held in abutment against a push button switch (10). The bearing member (8) is angularly movable with respect to the case 1, around the axis of stubs (8b). The axis of stubs (8b) and the axis of the rotary shaft (7a) are offset from each other. The rotary shaft (7a) and a rotary shaft (5a) of an encoder (5) are provided with respective pulleys (11,12) which are coupled to each other using a belt (13). In order to prevent water that can enter the housing (1) via the roller (7) to cause short circuits, the roller (7) is surrounded by a water receiving member (14) comprising a drainage passage (14b).

FIG. 2



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FIELD OF THE INVENTION

The present invention relates to an input device which is suitable as a remote-controlled device (hereinafter referred to simply as a remote control) for use in TVs and video tape recorders, for example, and which is designed to output a control signal to a display when a manipulatable roller is manually operated to rotate the same.

DESCRIPTION OF THE RELATED ART

As one of that type input devices, there has been conventionally known a remote control as disclosed in Japanese Utility Model Laid-Open No. 3-34383. The disclosed remote control comprises a manipulatable roller which is partly projecting through a window opening formed in a case, and an encoder mounted to a rotary shaft of the manipulatable roller inside the case. A control signal depending on the amount and the direction of rotation of the manipulatable roller, that are detected by the encoder, is outputted to a display as external equipment. Use of such a remote control enables an operator to move a cursor indicated on a CRT or the like of the display depending on the amount and the direction of rotation of the manipulatable roller, for example, by manually rotating the manipulatable roller. To decide image information displayed at the cursor position thus set, a decision key is depressed to actuate a push button switch in the case so that a necessary control signal may be outputted to the display. Note that the decision key is usually disposed in such a manner as to expose near the manipulatable roller.

With the prior art input device as mentioned above, however, because the decision key must be depressed after manually rotating the manipulatable roller, the amount through which a finger has to be moved for the manipulation is necessarily large and thus operability is not satisfactory.

Also, in order that the above type input device has a smaller thickness and improved operability, it is preferable to set a smaller diameter of the manipulatable roller and use an encoder whose size is as small as possible. However, even the small-sized encoder still has a relatively large diameter almost twice as large as a diameter of the small-sized manipulatable roller. For this reason, if the manipulatable roller and the encoder are coaxially arranged like the prior art device, there occurs a large stepwise difference in level between a manipulatable roller accommodating portion (i.e., a peripheral edge portion of the window opening) and an encoder accommodating portion on the manipulating surface of the case, thus adversely affecting an aesthetic appearance and the degree of freedom in design. An alternative disadvantage is

in that the manipulatable roller of a larger diameter than desired must be used to reduce such a stepwise difference in level.

Furthermore, in the above type input device, a clearance must be left to ensure smooth manipulation to rotate the manipulatable roller between the window opening of the case through which the manipulatable roller is exposed and the manipulatable roller. Accordingly, if water or the like is accidentally spilled over the case, the water may enter the case through the clearance and reach a printed circuit board or the like, with a fear of giving rise to a trouble of short-circuit.

SUMMARY OF THE INVENTION

Accordingly, a first object of the present invention is to solve the above-stated problems experienced in the prior art and provide an input device with a manipulatable roller which requires a smaller amount of movement of a finger necessary for the manipulation.

A second object of the present invention is to provide an input device in which an aesthetic appearance and the degree of freedom in design will not be adversely affected even by using a small-sized manipulatable roller.

A third object of the present invention is to provide an input device with a manipulatable roller which is less likely to cause a trouble of short-circuit even if water enters through the window opening of the case, and thus highly reliable.

The first object of the present invention is achieved with such a construction that a movable bearing member having a receiving portion to support a rotary shaft of a manipulatable roller in a journaled manner and a pressing portion held in abutment against a push button switch is disposed in a case and held angularly movable with respect to the case, and the center of angular movement of the movable bearing member and the axis of the rotary shaft are offset from each other.

The second object of the present invention is achieved with such a construction that the rotary shaft of the manipulatable roller and a rotary shaft of an encoder are provided with respective pulleys and these pulleys are coupled to each other using a belt.

The third object of the present invention is achieved with such a construction that a rib is projected from the case to surround the window opening of the case, and a water receiving member is disposed in the case, the water receiving member being provided with a main chamber which accommodates the manipulatable roller and is fitted with the rib, a sub-chamber which is adjacent to the main chamber and held in communication with a drainage passage, and a cut-out as a com-

municating passage between the main chamber and the sub-chamber.

With the above construction, when the manipulatable roller is pushed down by a finger, a rotative force is applied to the movable bearing member through the rotary shaft so that the pressing portion of the movable bearing member presses the push button switch in the case for actuating the same. Accordingly, a desired control signal can be outputted to the display by pushing down the manipulatable roller after manually rotating the same, without moving the finger the manipulatable roller.

Also, since the axis of rotation of the manipulatable roller and the axis of rotation of the encoder can be spaced from each other by any desired distance, the need of forming a large stepwise level difference in the manipulating surface of the case can be eliminated by setting the axis of rotation of the manipulatable roller having a reduced diameter at a position higher than the axis of rotation of the encoder.

Furthermore, since the space in the case facing the window opening is partitioned by the rib of the case and the main chamber of the water receiving member, some amount of water entering through the window opening can be accumulated in the main chamber and naturally dried up there without leaking to any other locations. Should a large amount of water enters the main chamber, the water would be caused to flood through the cut-out to flow into the sub-chamber, followed by discharge through the drainage passage from the sub-chamber.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is an exploded perspective view of principal parts of a remote control according to one embodiment of the present invention.

Fig. 2 is a view for explaining operation of the remote control.

Fig. 3 is a sectional view of the remote control taken along in the lengthwise direction of a manipulatable roller.

Fig. 4 is a sectional view of the remote control taken along in the radial direction of the manipulatable roller.

Fig. 5 is an entire plan view of the remote control.

Fig. 6 is a perspective view, partly omitted, showing the positional relationship between a movable bearing member for the manipulatable roller and a push button switch of the remote control.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Hereinafter, an embodiment of the present invention will be described with reference to the drawings.

Figs. 1 through 6 are all conducive to explain a remote control as one embodiment of an input device according to the present invention in which; Fig. 1 is an exploded perspective view of principal parts of the remote control, Fig. 2 is a view for explaining operation of the remote control, Fig. 3 is a sectional view of the remote control taken along in the lengthwise direction of a manipulatable roller, Fig. 4 is a sectional view of the remote control taken along in the radial direction of the manipulatable roller, Fig. 5 is an entire plan view of the remote control, and Fig. 6 is a perspective view, partly omitted, showing the positional relationship between a movable bearing member for the manipulatable roller and a push button switch of the remote control.

The input device shown in these drawings serves as a remote control for use in TVs and video tape recorders, and has a resin-made case 1 comprised of an upper case 2 and a lower case 3 combined with each other. A printed circuit board 4, an encoder 5 and so on are incorporated inside the case 1. On the surface of the upper case 2 as the manipulating surface, there are exposed a plurality of key switches 6 adapted to turn on, or off a power supply, select a menu and adjust sound volume, by way of example, as well as a manipulatable roller 7 adapted to control the position of a cursor, by way of example.

The manipulatable roller 7 is integral with a rotary shaft 7a made of metal, the rotary shaft 7a being supported by a pair of receiving portions 8a of a resin-made movable bearing member 8 in a journalled manner which is assembled in the case 1. The manipulatable roller 7 is therefore rotatable about its own axis while partly projecting through a window opening 1a bored in the manipulating surface of the case 1. A pair of recessed projections 2a projecting from the rear surface of the upper case 2 and a pair of recessed projections 9a on a resin-made support plate 9 for supporting the printed circuit board 4 inside the case 1 cooperatively support respective stubs 8b of the movable bearing member 8 in a journalled manner, which are projected with their axes set offset from the axis of the rotatable shaft 7a, so that the movable bearing member 8 is held in the case 1 to be rotatable with respect thereto. When the manipulatable roller 7 is pushed down, a rotative force is applied to the movable bearing member 8 through the rotary shaft 7a, causing both the manipulatable roller 7 and the movable bearing member 8 to rotate to-

gether about the stubs 8b. Then, a pressing ledge 8c projecting from a predetermined position of the movable bearing member 8 is kept in abutment against a push button switch 10 disposed on one end side of the printed circuit board 4. Accordingly, when the manipulatable roller 7 is pushed down to rotate the movable bearing member 8, the pressing ledge 8c presses the push button switch 10 so that the switch 10 is actuated. (See Fig. 2 and Fig. 6).

Further, a pulley 11 is attached to one end of the rotary shaft 7a of the manipulatable roller 7 and, likewise, a pulley 12 is attached to one end of a rotary shaft 5a of the encoder 5, both the pulleys 11, 12 being coupled to each other by a timing belt 13. In other words, use of the pulleys 11, 12 and the timing belt 13 provides the construction by which both the rotary shafts 7a, 5a can be rotated in interlock relation with no shift in angular phase therebetween, while keeping the axis of rotation of the manipulatable roller 7 and the axis of rotation of the encoder 5 spaced from each other. As a result, the amount and the direction of rotation of the manipulatable roller 7 can be surely detected by the encoder 5.

Moreover, a tube-shaped rectangular rib 2b is projected on the rear surface of the upper case 2 to surround the window opening 1a, and a water receiving member 14 made of rubber is disposed between the manipulatable roller 7 and the movable bearing member 8 in the case 1. The water receiving member 14 is divided into a main chamber 14a which accommodates the manipulatable roller 7 and is fitted with the rib 2b, and a small sub-chamber 14b which is positioned adjacent to the main chamber 14a and held in communication with a drainage passage 15 (see Fig. 3). The main chamber 14a and the sub-chamber 14b are provided in their side walls with respective U-shaped slots 14c which are recessed to be out of interference with the rotary shaft 7a of the manipulatable roller 7. A partition between the main chamber 14a and the sub-chamber 14b is provided with a cut-out 14d which serves as not only a slot recessed to be out of interference with the rotary shaft 7a, but also a communicating passage deeper than the U-shaped slot 14c. In addition, the rib 2b on the rear surface of the upper case 2 is similarly provided with a pair of U-shaped slots 2c recessed to be out of interference with the rotary shaft 7a. Note that a through hole 8d bored in the movable bearing member 8 and a through hole 9b bored in the support plate 9, shown in Fig. 1, are communicated with the sub-chamber 14b of the water receiving member 14 to form the drainage passage 15.

With the present remote control constructed as has been explained, when the manipulatable roller 7 exposing through the window opening 1a of the case 1 is manually rotated, the amount and the

direction of rotation of the manipulatable roller 7 are detected by the encoder 5 and a signal for controlling the position of a cursor indicated on a CRT of a TV set is outputted to move the cursor in a desired manner. In order to decide image information displayed at the set position of the cursor, the manipulatable roller 7 having been rotated to set the cursor position is now pushed down, as shown in Fig. 2, to press and actuate the push button switch 10 through the pressing ledge 8c of the movable bearing member 8, whereupon a predetermined control signal is outputted to provide the necessary information. Accordingly, after manually rotating the manipulatable roller 7, the operator can output a desired control signal by pushing down the manipulatable roller 7 without moving his or her finger from the roller 7. Therefore, the amount through which the finger must be moved for actuating the switch is reduced and a high degree of operability is expected. It should be noted that since the manipulatable roller 7 is pushed down against the resilient force of a return spring (not shown) assembled in the push button switch 10, removal of the push-down force allows the manipulatable roller 7 and the movable bearing member 8 to be returned to the original position by the resilient force of the return spring. In other words, the manipulatable roller 7 and the movable bearing member 8 are both angularly movable about the stubs 8b and the angle of this angular movement is set so large that the pressing ledge 8c can be displaced by a distance corresponding to the stroke through which the push button switch 10 is actuated.

Further, with the present remote control, the pulley 11 attached to the rotary shaft 7a of the manipulatable roller 7 and the pulley 12 attached to the rotary shaft 5a of the encoder 5 are coupled to each other by the timing belt 13, and the axis of rotation of the manipulatable roller 7 having a reduced diameter is set at a position higher than the axis of rotation of the encoder 5 which is also reduced in size, but still has a relatively large diameter. This construction eliminates not only the need of forming a large stepwise level difference in the manipulating surface of the case 1 (i.e., the surface of the upper case 2), but also any fear of impairing an aesthetic appearance and restricting the degree of freedom in design. Then, since the axis-to-axis distance between the manipulatable roller 7 and the encoder 5 coupled to each other by the timing belt 13 is allowed to shift depending on a play of the timing belt 13, there occurs no problem even when the manipulatable roller 7 is angularly moved to some extent about the stubs 8b of the movable bearing member 8. Where the components are arranged such that the above axis-to-axis distance is widened upon the manipulatable

roller 7 being pushed down (see Fig. 2) like this embodiment, the return force of the timing belt 13 itself is also utilized when the manipulatable roller 7 and the movable bearing member 8 are both returned to the original position after pushing down the manipulatable roller 7. In opposition to the illustrated embodiment, even where the components are arranged such that the above axis-to-axis distance is narrowed upon the manipulatable roller 7 being pushed down, there occurs no problem so long as the return spring used for returning the push button switch 10 has a relatively strong resilient force.

In addition, with the present remote control, the space in the case 1 facing the window opening 1a is partitioned by the rib 2b on the rear surface of the upper case 2 and the main chamber 14a of the water receiving member 14. Therefore, even if some amount of water enters the case 1 through the window opening 1a, for example, upon water being accidentally spilled over the case, the water can be accumulated in the main chamber 14a and naturally dried up there without leaking to any other locations. Should a large amount of water enters the main chamber 14a, the water would be caused to flood through the cut-out 14d to flow into the sub-chamber 14b, followed by discharge through the drainage passage 15 from the sub-chamber 14b. As a result, there is no fear that the water entered through the window opening 1a may give rise to a trouble of short-circuit, which ensures high reliability.

It should be noted that functions effected by manually operating the manipulatable roller to rotate and push down the same can be set optionally depending on demands. By way of example, those functions may be set such that images are advanced frame by frame or scrolled by rotating the manipulatable roller 7 and on/off control of rewinding and fast forwarding of tapes may be changed over by pushing down the manipulatable roller 7.

It is needless to say that the present invention is also applicable to any desired input devices with manipulatable rollers other than the illustrated remote control.

According to the present invention, as has been described above, since the push button switch in the case can be pressed and actuated through the movable bearing member by pushing down the manipulatable roller after manually rotating the same, it is possible to provide the input device with the manipulatable roller which requires a smaller amount of movement of a finger necessary for the manipulation and thus has a high degree of operability.

Also, according to the present invention, since the encoder is interlockingly coupled to the ma-

nipulatable roller through the pulleys and the belt, the axis of rotation of the manipulatable roller having a reduced diameter can be set at a position higher than the axis of rotation of the encoder. This eliminates the need of forming a large stepwise level difference in the manipulating surface of the case. As a result, there can be obtained advantages of improving an aesthetic appearance and increasing the degree of freedom in design of the thin-type input device with the manipulatable roller.

Furthermore, according to the present invention, even if water enters through the window opening of the case through which the manipulatable roller is exposed, the water can be accumulated in the main chamber of the water receiving member and naturally dried up there, or the water can be discharged through the drainage passage from the sub-chamber of the water receiving member. It is thus possible to provide the input device with the manipulatable roller which has no fear of causing a trouble of short-circuit with the water entering through the window opening of the case and is highly reliable.

Claims

1. An input device in which a first control signal is outputted to a display as external equipment by manually rotating a manipulatable roller which is partly projecting through a window opening of a case, and a second control signal is outputted to said display by pressing a push button switch incorporated in said case to be actuated, wherein a movable bearing member having a receiving portion to support a rotary shaft of said manipulatable roller in a journalled manner and a pressing portion held in abutment against said push button switch is disposed in said case and held angularly movable with respect to said case, and the center of angular movement of said movable bearing member and the axis of said rotary shaft are offset from each other.
2. An input device comprising a manipulatable roller which can rotate about its own axis and is partly projecting through a window opening of a case, and an encoder which is incorporated in said case and rotated in interlock with said manipulatable roller, said input device outputting a control signal to a display as external equipment depending on the amount and the direction of rotation of said manipulatable roller that are detected by said encoder, wherein a rotary shaft of said manipulatable roller and a rotary shaft of said encoder are provided with respective pulleys and these pulleys are coupled to each other using a belt.

3. An input device according to claim 2, wherein a movable bearing member having a receiving portion to support the rotary shaft of said manipulatable roller in a journalled manner and a pressing portion held in abutment against a push button switch is disposed in said case and held angularly movable with respect to said case, and the center of angular movement of said movable bearing member and the axis of said rotary shaft are offset from each other.
4. An input device in which a control signal is outputted to a display as external equipment by manually rotating a manipulatable roller which is partly projecting through a window opening of a case, wherein a rib is projected from said case to surround said window opening of said case, and a water receiving member is disposed in said case, said water receiving member being provided with a main chamber which accommodates said manipulatable roller and is fitted with said rib, a sub-chamber which is adjacent to said main chamber and held in communication with a drainage passage, and a cut-out as a communicating passage between said main chamber and said sub-chamber.

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FIG. 1

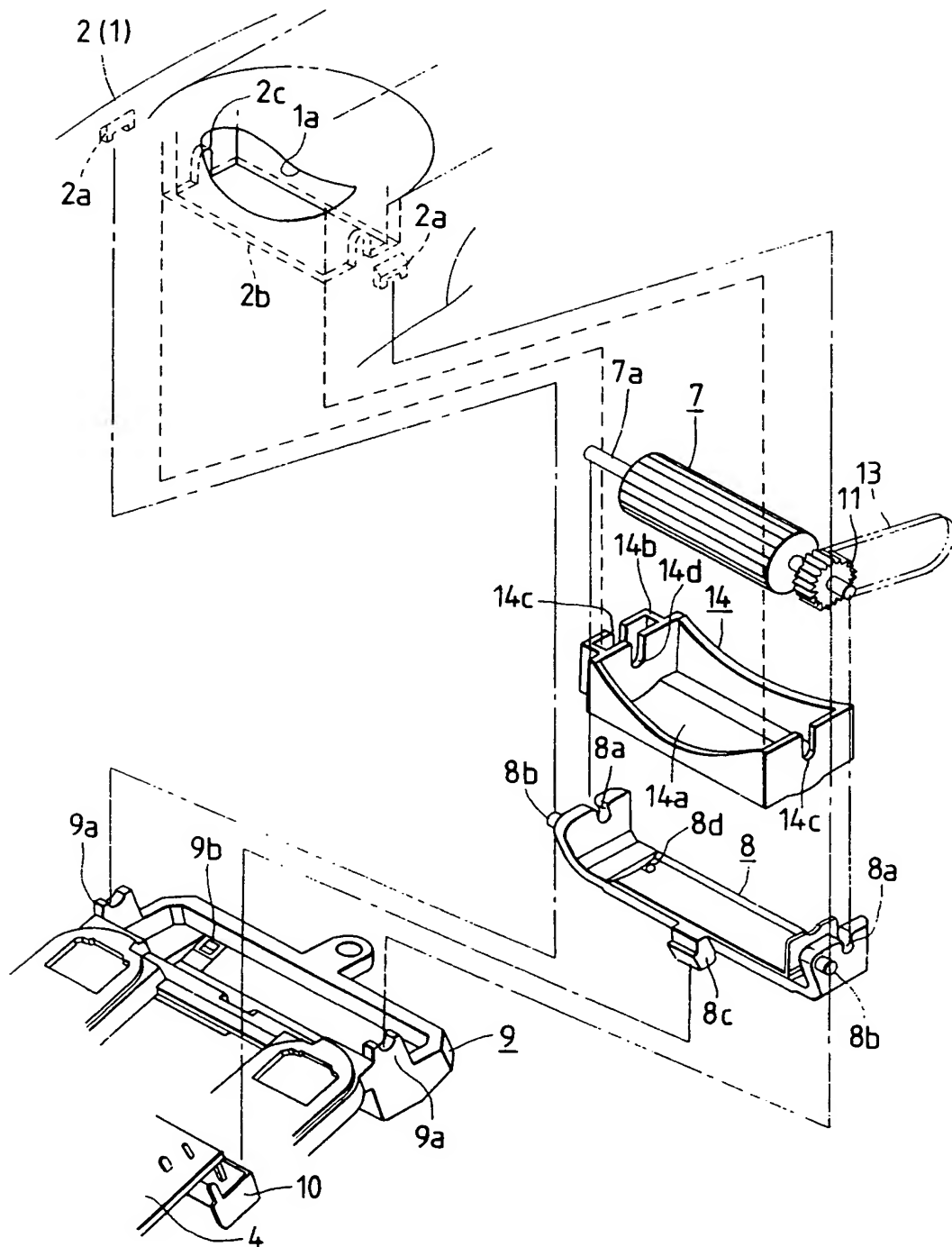


FIG. 2

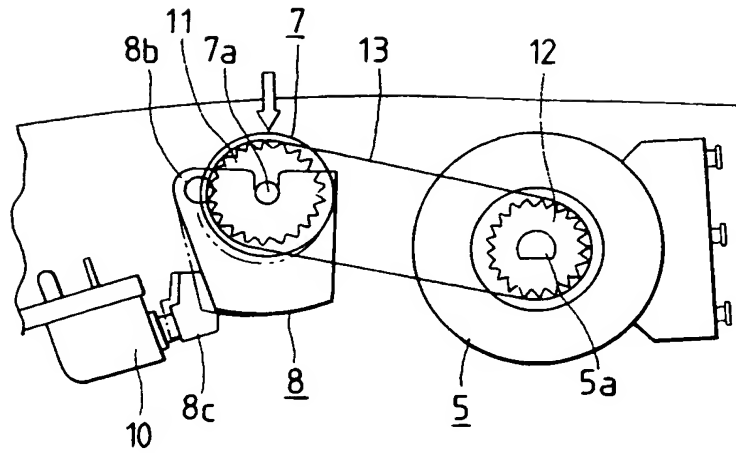


FIG. 3

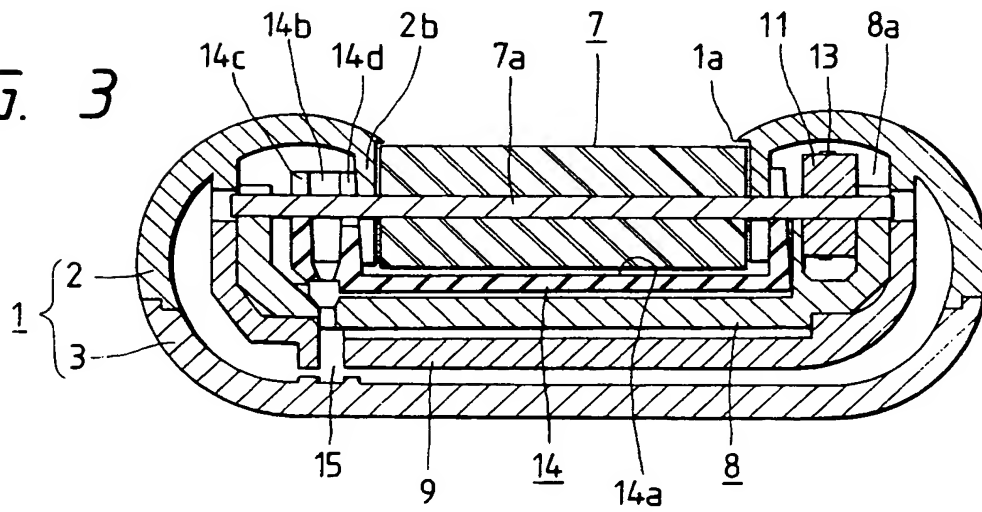


FIG. 4

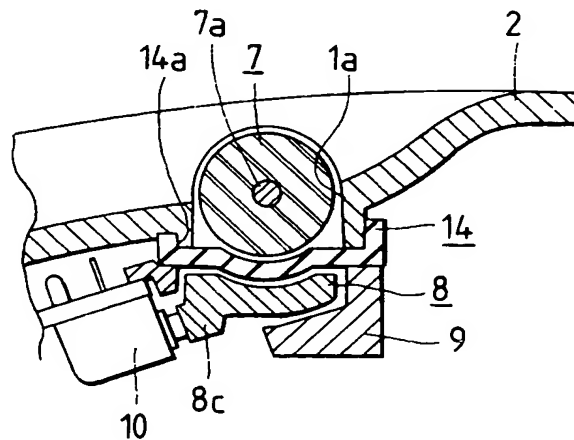


FIG. 5

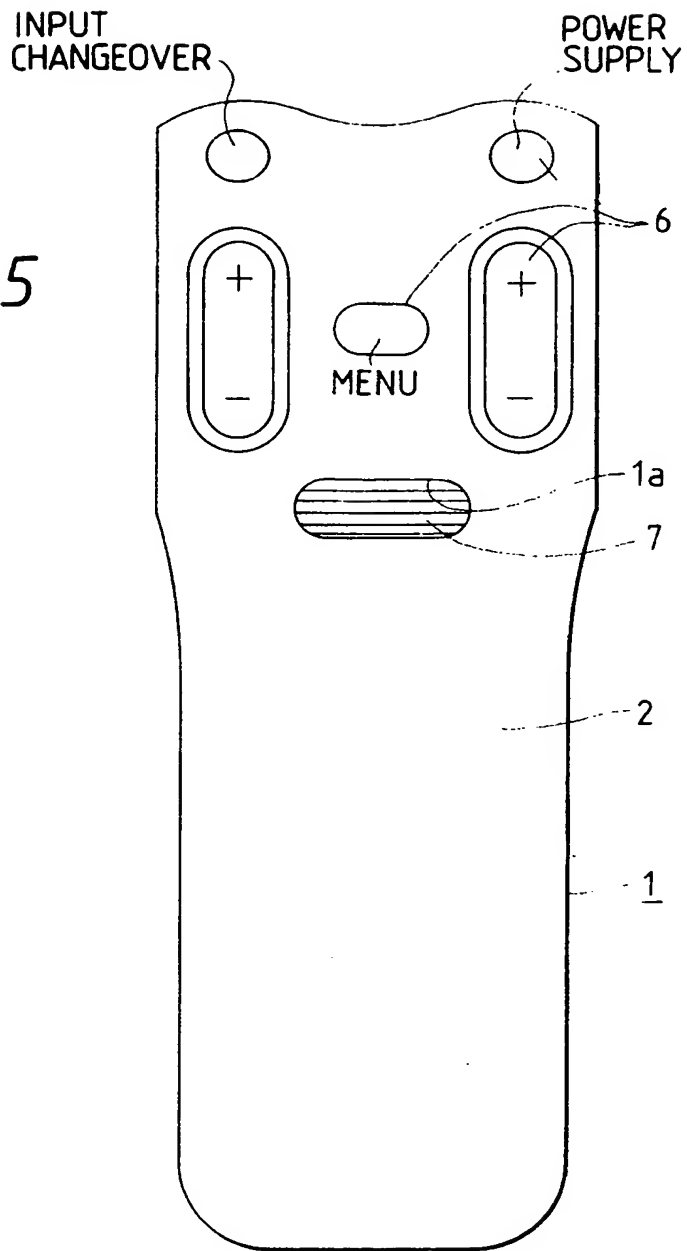
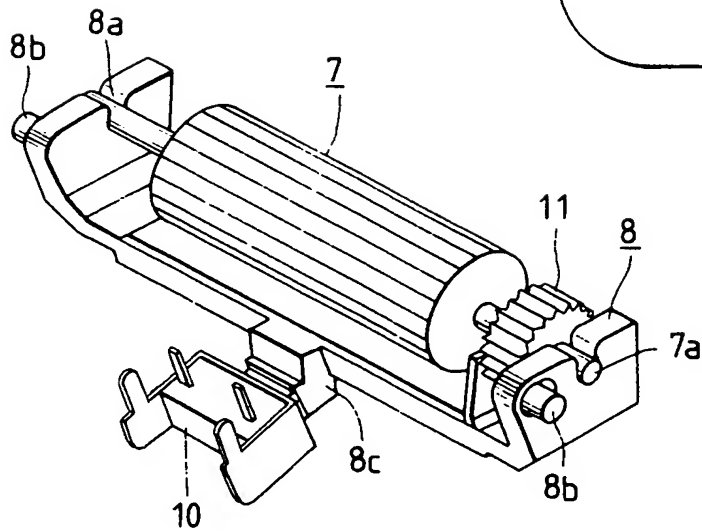


FIG. 6





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EUROPEAN SEARCH REPORT

Application Number

EP 92 11 4745

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	EDN ELECTRICAL DESIGN NEWS vol. 34, no. 3, 2 February 1989, NEWTON, MASSACHUSETTS US pages 119 - 120 STEVEN H. LEIBSON : 'Thumb-actuated, cursor-positioning device provides 2-D axis control in a small space.' ---	1,3	H03J9/06 G06K11/18
A	IBM TECHNICAL DISCLOSURE BULLETIN vol. 32, no. 3B, August 1989, NEW YORK US pages 122 - 123 'Space bar that rolls.' ---	1,3	
A	DE-A-3 906 585 (DEUTSCHE THOMSON-BRANDT GMBH) * column 2, line 46 - line 58 * ---	1,2	
A	EP-A-0 382 353 (HEWLETT-PACKARD COMPANY) * column 4, line 54 - column 5, line 17 * ---	1,2	
A	US-A-4 045 777 (MIERZWINSKI ET AL.) * the whole document * -----	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			G06K H03J H04B H01H
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 02 DECEMBER 1992	Examiner PEETERS M.M.G.
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